BEFORE THE
PUBLIC SERVICE COMMISSION
OF SOUTH CAROLINA

DOCKET NO. 2018-3-E

In the Matter of Annual Review of Base Rates for Fuel Costs for Duke Energy Carolinas, LLC	)))))	**REBUTTTAL TESTIMONY OF GLEN A. SNIDER FOR DUKE ENERGY CAROLINAS, LLC**

Q. PLEASE STATE YOUR NAME, BUSINESS ADDRESS AND CURRENT POSITION.

A. My name is Glen A. Snider, and I am the Director of Carolinas Resource Planning and Analytics for Duke Energy Corporation. My business address is 400 South Tryon Street, Charlotte, North Carolina 28202.

Q. DID YOU PREVIOUSLY FILE DIRECT TESTIMONY IN THIS DOCKET?

A. Yes, I filed direct testimony discussing the Company's calculation of the Value of Solar for Net Energy Metering ("NEM") Distributed Energy Resources ("DER").

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY IN THIS PROCEEDING?

A. The purpose of my rebuttal testimony is to address issues raised by South Carolina Coastal Conservation League and Southern Alliance for Clean Energy witness, Devi Glick.

Q. DO YOU AGREE WITH WITNESS GLICK THAT NEM DISTRIBUTED ENERGY RESOURCES AVOID TRANSMISSION AND DISTRIBUTION INVESTMENTS BY DEC AND THEREFORE SHOULD BE ASSIGNED A VALUE GREATER THAN ZERO?

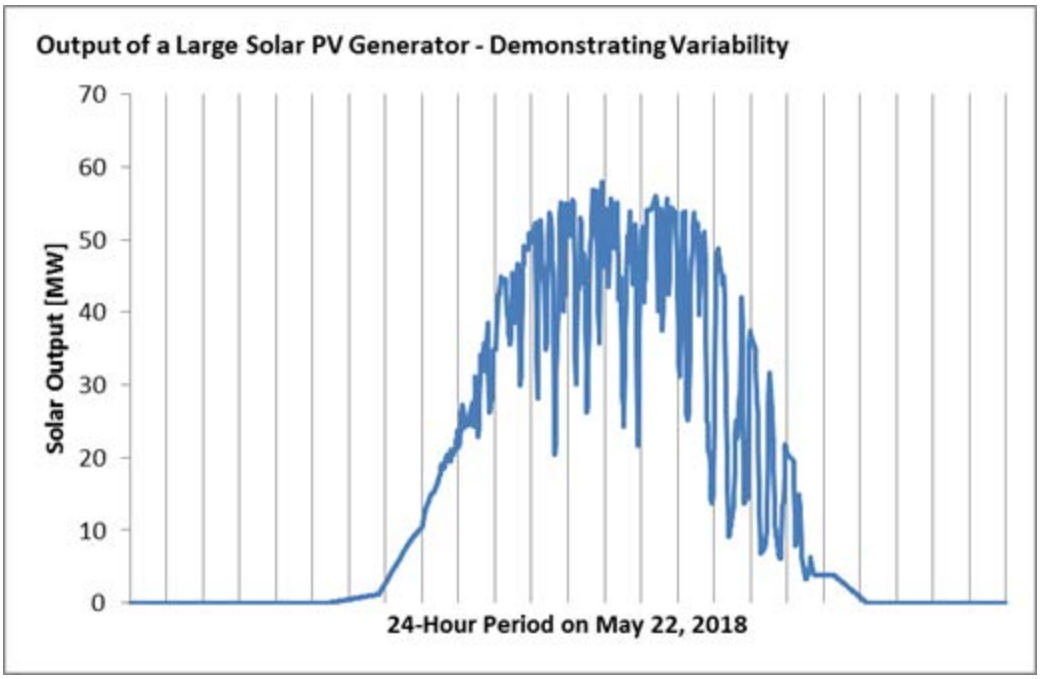
A. No, I do not. DEC has concluded that NEM DER does not avoid transmission or distribution investments by the Company. The Commission has recognized in recent fuel proceedings that utilities "must design [their] transmission and distribution system so as to provide safe and reliable electric service, even when

intermittent generation sources such as solar facilities and other small QFs are not producing power." Docket No. 2018-2-E, Order No. 2018-322 at 33; see also Docket No. 2018-1-E, Order No. 2018-456 at 9; Docket No. 2017-2-E, Order No. 2017-246 at 24. Transmission and distribution infrastructure must be able to meet peak demands and provide reliable service 365 days a year, 24 hours a day. Planners have no guarantee that a solar NEM will be producing coincident with the peak demand needs of a circuit. Furthermore, when developing plans, the Company cannot control the amount or location of solar output generated from NEM customers. These factors of coincidence, intermittency, nondispatchability and uncertainty in NEM DER location and quantity make it impossible for NEM DER to avoid investments related to transmission or distribution.

Q. PLEASE ELABORATE ON THE ISSUES OF COINCIDENCE AND INTERMITTANCY.

A. As previously stated, Distribution Planning is unable to rely on solar NEM to provide capacity during peak times due to their non-coincidence with demand peaks and their intermittent output. For example, circuits that experience peak load conditions in the winter have no NEM DER available at time of peak since winter peaking conditions often occur prior to sunrise. As such, NEM DER would not be useful to avoid costs associated with meeting that winter peak. In 2014, the annual peak demand requirement on 71% of the Company's distribution feeders occurred during the winter. In addition, as seen in the graph below for a large single site PV installation, the generator output over a 24-hour

period can vary significantly throughout the day with cloud cover. This makes it difficult to reduce the capacity of distribution assets without a risk of overloading a circuit. Smaller net metered PV installations exhibit a similar intermittent load characteristic.



With regard to distribution costs or benefits, NEM DER may actually drive additional investments in the distribution system as a result of increasing the size of service transformers to accommodate reverse flow of power (known as "backfeed"), additional monitoring equipment, and updating voltage control schemes. This is particularly true in instances where deployment of NEM has been robust, such as a neighborhood where a large percentage of customers install NEM distributed energy resources or when NEM distributed energy resources interconnect to a circuit that already has larger, utility-scale solar installed.

Q. DO YOU AGREE WITH MS. GLICK'S ASSERTION THAT DISTRIBUTED SOLAR GENERATION HAS AN IDENTICAL IMPACT TO THE SYSTEM AS DEMAND-SIDE ENERGY EFFICIENCY?

A. No that assertion is incorrect from multiple perspectives. Demand-side energy efficiency measures create a reduction in load in a predictable manner, as opposed to NEM solar, which actually puts electricity back onto the grid in an unpredictable manner. For example, consider the contrast of efficient lighting as compared to NEM solar. I use lighting as an example since the majority of energy efficiency savings achieved nationally has come through efficient lighting programs. In the case of efficient lighting, consider an example of a 100 watt incandescent bulb being replaced by a 10 watt LED bulb. The result of that replacement is a dependable 90 watt savings in lighting load. The lighting savings achieved cannot result in a backfeed to the distribution system, it is not intermittent in nature and it has a dependable impact on early morning winter peaks. Rooftop solar generation by contrast results in backfeed onto the distribution system, is intermittent in nature and cannot be depended on to reduce early morning winter peaks. So while both efficient lighting and rooftop solar provide overall energy savings for the customer, the nature of those savings and their impact on the grid is completely different.

Q. IS THE IMPACT OF DISTRIBUTED SOLAR PV TO THE TRANSMISSION SYSTEM SIMILAR TO THE IMPACT SEEN ON THE DISTRIBUTION SYSTEM?

A. Yes, the same general issues apply. As Witness Glick references in her testimony, the value of avoided transmission and distribution capacity investments must factor in solar's peak coincidence and effective capacity. As I have previously stated, solar output is not coincident with winter peaks and, as such, capital investments in the distribution and transmission system that are required for winter peaks cannot be avoided by solar generation. With respect to the concept of effective capacity, Ms. Glick, on page 8 of her testimony, defines effective capacity as "[h]ow much firm capacity can the distributed solar be expected to provide during the peak hour (in both the summer and winter)." As previously described, issues such as cloud cover or snow cover can dramatically reduce solar output, making this a "non-firm" resource that cannot be depended on to reduce peak demand on a circuit. Ms. Glick in her analysis uses a system-wide average summer peak coincidence for solar of 46%. While that may be an appropriate representation of an average amount of solar that may be online across the system on all summer days, it certainly does not represent the "firm" capacity that can be depended on for a given peak day on a given circuit.

Q. WITH RESPECT TO AVOIDED TRANSMISSION, IS MS. GLICK CORRECT IN ASSUMING THAT BECAUSE DISTRIBUTED SOLAR PV DOES NOT DIRECTLY FLOW BACK ONTO THE

TRANSMISSION SYSTEM, THE IMPACTS CAN BE REASONABLY QUANTIFIED BASED ON THE TOTAL AMOUNT OF PV ON THE SYSTEM?

A. No. Even if a collection of rooftop PV systems do not directly flow back onto the transmission system it may still negatively impact the transmission system and result in additional transmission expenses rather than avoided expenses. To better understand this issue first consider the fact that DEC is placing into service significant amounts of utility scale transmission and distribution connected solar facilities. These generation facilities create new load flows on the transmission system causing constraints in certain areas of the grid. These areas that may have historically been load pockets on the grid, but, due to the addition of solar facilities, those same areas have the potential to now become generation pockets. By "generation pocket," I mean an area of the grid that has more generation than load, resulting in a net export from that portion of the grid. If rooftop solar is placed in these constrained areas, it results in even more energy needing to be exported from the area with the potential to further exacerbate a transmission constraint. These negative impacts to the transmission grid explained in this example occur even though the NEM solar is not assumed to backfeed to the transmission grid.

Q. HOW DO YOU RESPOND TO WITNESS GLICK'S ASSERTION THAT THE CALIFORNIA ISO HAS RECOGNIZED $2.6 BILLION OF BENEFITS FOR AVOIDED TRANSMISSION COSTS?

A. The California ISO Board of Governors approved $271 million in new transmission projects while cancelling $2.6 billion in projects that were claimed not to be needed due to consecutive years of declining load forecasts. The one-in-ten ratio of approved investment expenditures to those cancelled raises significant questions about what transmission projects were actually required in the first place. The report goes on to say that energy efficiency and rooftop solar contributed to the decline in the load forecast. However, there is no specific link in the report that quantifies rooftop solar's impact on specific transmission project cancellations. Finally, the California power system is completely different from DEC's power system and as such cannot be used as examples for DEC.

Q. PLEASE ELABORATE ON SOME OF THESE DIFFERENCES.

- California imports nearly one third of all its energy requirements from other states in both Northwest and Southwest regions of the country.[1] This requires completely different transmission infrastructure and investments to accommodate this level of imports that are not consistent with DEC's transmission system.
- California is a summer planning utility with minimal energy needs relative to South Carolina. For example, California has less than half of the cooling load

[1] *See* California Energy Commission, Total System Electric Generation, available at http://www.energy.ca.gov/almanac/electricity_data/total_system_power.html (last visited Aug. 24, 2018).

of DEC's service territory with minimal electric heating load.[2] This creates different load and peak conditions, usage profiles, and solar coincidence factors relative to the system.

- Again according to EIA, California has retail electricity rates that are fifty percent higher than SC retail rates[3] which should give pause to using California as an example for energy policy.

Q. HAVE YOU REVIEWED WITNESS GLICK'S CURRENT VALUE CALCULATION SHE USED TO DERIVE HER ESTIMATES FOR AVOIDED TRANSMISSION VALUE?

A. Yes I have.

Q. IS MS. GLICK'S CURRENT VALUE CALCULATION APPROPRIATE FOR INCLUSION OF THE AVOIDED TRANSMISSION VALUE SHE IS RECOMMENDING IN HER TESTIMONY?

A. No it is not. Ms. Glick's is taking the non-depreciated book value existing of transmission assets on a dollar per MW basis and apportioning that to solar based on its winter capacity value. In short, this type of analysis assumes that historical transmission spend is equal to future spend on a dollar per MW basis. It further assumes that rooftop PV solar will "on average" avoid that spend. As I have previously stated rooftop PV is neither coincident nor dependable in a manner needed to avoid transmission and distribution investment and it is

[2] *See* Energy Information Association description of degree days, available at https://www.eia.gov/energyexplained/index.php?page=about_degree_days (last visited Aug. 24, 2018). *See also* https://www.eia.gov/todayinenergy/detail.php?id=18131 (last visited Aug. 24, 2018).
[3] Energy Information Association data available at https://www.eia.gov/electricity/state/ (last visited Aug. 24, 2018).

possible for rooftop NEM solar to actually increase costs depending on its location.

Q. ON PAGES 14 THROUGH 17 OF WITNESS GLICK'S TESTIMONY, SHE DISCUSSES THE VALUE OF AVOIDED ENVIRONMENTAL COSTS IN THE CALCULATION OF NEM DISTRIBUTED ENERGY RESOURCES. HAS THE COMPANY QUANTIFIED VARIABLE OPERATIONAL COSTS ASSOCIATED WITH COAL ASH DISPOSAL FOR THE PURPOSES OF CALCULATING NEM DISTRIBUTED ENERGY RESOURCES?

A. Yes, the variable operational costs associated with coal ash disposal are included within the avoided energy component of the calculation of NEM DER. With respect to the inclusion of coal ash handling costs in the value of solar calculation, it must first be recognized that only a small percentage of coal remains as ash in the coal combustion process. To the extent an NEM DER reduces the amount of coal burned, both the cost of the coal itself and the cost of handling the small amount of residual ash are included as an avoided energy benefit. Finally, NEM DER only reduces the amount of coal burned and its associated residual ash to the extent the coal plant was operating on the margin in the first place. Given the low price of natural gas, remaining coal units are operating at lower capacity factors in favor of natural gas generation. This further reduces the value of NEM DER as it pertains to avoided coal ash costs.

Q. DO YOU AGREE THAT CAPITAL COSTS ASSOCIATED WITH BUILDING NEW ON-SITE SHOULD BE INCLUDED FOR PURPOSES OF CALCULATING NEM DISTRIBUTED ENERGY RESOURCES?

A. No. Ms. Glick calculates the value of potentially avoiding the expansion of on-site ash landfills to be 2 one-thousandths of one cent per kWh for NEM rooftop solar's ability to avoid the potential expansion of the Cliffside and Marshall on-site landfills. These expansions represent potential investments that may needed in 2023 and 2025 respectively. Not only does this value effectively round to zero today, the small value Ms. Glick calculates would not begin to accrue until 2023 at the earliest assuming the expansion of the landfill is actually needed at that point in time. Given continued reductions is coal burns and considering the fact that the Cliffside generation facility is adding the ability to burn natural gas it is completely possible that a landfill expansion will not be needed at that time. In summary, to ascribe such a negligible value today would be premature and inappropriate. To the extent additional landfill expansions are needed at some future point and the costs associated with those potential future expansions are known and measurable it may then be appropriate to consider such a quantification.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes. It does.